Individual and Community-Level Socioeconomic Factors and Drug Court Outcomes: Analysis and Implications

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Statement of the Research Problem

Despite varying reports of success in reducing drug crime and relapse, the overall perception within the substance abuse field is that drug court treatment is a generally effective approach (Belenko, 2001). However, the large majority of evaluation findings reported come from large drug court programs in metropolitan regions with many available service and treatment options (Banks & Gottfredson, 2003; Harrell, Cavanaugh & Roman, 2000). These programs may benefit by the socioeconomic strength of the communities in which the drug courts are situated (Wenzel, Turner, & Ridgely, 2004; Peyton & Gossweiler, 2001). While replicated studies have found socioeconomic and social class factors to be related to substance abuse and recovery, drug abuse is usually treated as an individual level problem. As a result, research agendas that examine community-level problems like drug abuse using multidimensional models have remained undeveloped. How this community-based treatment may operate in smaller, less densely populated areas with fewer treatment and service options also has not been investigated prior to this study. An awareness of how socioeconomic stability factors at both the individual and community level may impact the capability of drug courts to promote recovery and reduce drug-related recidivism is necessary so that adequate efforts to address these concerns can be infused within the drug court programs' designs prior to full implementation. The purpose of this study was to comprehensively and rigorously explore the effect of socioeconomic and community stability upon community-based treatment in drug court.

Research Background and Hypotheses

Drug Courts: An Overview

Drug courts were first developed in Dade County (Miami), Florida in 1989 as an alternative to the traditional, adversarial prosecution of individuals' court cases who were using or abusing drugs (Harrell, 2003). This treatment delivery system originally grew from a need to relieve the tremendous backlog of drug-related court cases that had clogged the criminal justice process across the country to a point of virtual paralysis in

some jurisdictions. The first preliminary efforts to address the drug case backlog on court dockets resulted in the development of two types of drug courts: 1) a "fast track" court model in which the primary goal was expedient case disposition, known as "differentiated case management" and 2) "dedicated drug treatment" courts which emphasized linking defendants to community-based drug treatment and providing more intensive case management and supervision (Deschenes and Greenwood, 1994). Early evaluations conducted during this formative era indicated that the desired objective of faster case processing did occur in differentiated case management courts, but arguably to the detriment of due process (Belenko, Fagan, Dumanovsky, 1994), and left the offender untreated and vulnerable to system reentry (Belenko, 2002).

Though considerable resources were needed to promote a team-oriented, therapeutic approach toward drug-involved offenders, dedicated drug treatment courts were believed to promise substantial long-term individual and societal benefit over what could be achieved through the "fast track" model (Deschenes & Greenwood, 1994). What were known then as dedicated drug treatment drug courts in the early stages of drug court development became the prototype of contemporary drug court treatment, as recognition of these potential benefits led to the gradual adoption of a "therapeutic jurisprudence" perspective on addressing the needs of drug offenders. Simply, the theory behind therapeutic jurisprudence is that the court process, through its rules, official roles, and legal procedures can be a therapeutic or anti-therapeutic experience depending on how its power and official functions are used (Hora, 2002). Combining the elements of a non-adversarial courtroom, behavioral modification through appropriate sanctions and rewards, team-oriented decision making, judicial monitoring and interaction with offenders, long-term treatment, case management and close supervision (Belenko, 2002) resulted in the contemporary model of drug court treatment guided by a therapeutic jurisprudence philosophy. This framework is reflected within the Ten Key Components, a set of general standards for drug court intervention established by the Drug Courts Program Office in 1997 (United States Department of Justice, 1997).

As a treatment model, drug courts provide a unique approach by combining long-term substance abuse treatment and criminal justice supervision, both which have been shown to have separate and positive effects for increasing retention of drug-involved offenders in treatment and reducing recidivism and drug use among these individuals (Leukefeld, Tims, & Farabee, 2002; Hiller, Knight, Leukefeld, & Simpson, 2002; Nurco, Hanlon, Bateman, & Kinlock, 1995). Drug courts have enjoyed widespread popularity across the political spectrum and have become in many regions the "treatment of choice" for drug-involved offenders (Belenko, 2002). The most recent data from November 2003 indicate that there are a total of 1,093 drug courts nationwide, comprised of 696 adult, 294 juvenile, 89 family, and 14 combined drug court programs. Additionally, 235 adult, 112 juvenile, 66 family and one combined drug court were in the planning stages as of November 2003 (American University, 2003). In 2001, it was estimated that 220,000 adults and 9,000 juveniles had received treatment services in drug courts (American University, 2001).Studies have indicated that drug courts may be effective for reducing recidivism and drug use among drug-involved offenders (Gottfredson, Najaka, & Kearley, 2003; Belenko, 1999, 2001; Harrell, Cavanagh, and Roman, 2000; Peters & Murrin, 2000). Within Belenko's most recent summary (2001), he presents a review of 37 drug court evaluations, including 6 studies that reported outcome data. He notes that 4 of

the 6 evaluations found drug courts to reduce recidivism to the criminal justice system, and that the most scientifically rigorous studies (i.e., random assignment to a control condition) all found reductions in recidivism rates, although some differences were not substantial. Most studies that calculated program costs found that drug courts helped "save" money, primarily through the reduction of recidivism.

"Success" in drug court treatment has been described by a variety of outcomes: recidivism, drug use, societal costs/benefits estimated by participant income, welfare and incarceration costs. During-treatment effectiveness studies frequently include a proxy relapse measure based upon the number of positive urine screens, in addition to the monitoring of program retention, completion, and during-program recidivism (see Gottfredson, Najaka, and Kearley, 2003; Banks and Gottfredson, 2003; Peters and Murrin, 2000; Truitt, et al., 2002). More often than not, drug courts appear to achieve some measure of success in treatment of court-referred clients. However, the wide range of positive outcomes reported, including varying recidivism rates, suggest that much of what has been learned from individual program evaluations is incomparable due to differences in the definition of "success." It is important to note that in these studies, despite their differences in designs and definitions, the one aspect in which they generally agree is the acceptance of rearrest as the measure of recidivism. The choice of this measure does not allow for the possibility that any of those arrested may have been found innocent; guilty of a lesser charge that would not have met some researchers' definitions of recidivism; or had their cases disposed of in some other typical way that did not result in conviction, such as a prosecutor's decision to not pursue a case or dismiss charges. Consistency and clarity is greatly needed in the measurement of "success," particularly in the case of measuring recidivism (Belenko, 2002). Perhaps the clearest conclusion that can be made about drug court effectiveness is that it is uncertain how much variability can be expected to exist across drug court programs' outcome measures because what constitutes success has not been substantively decided and equivalently measured.

Socioeconomic Class and Substance Abuse

Large-scale population surveys indicate that drug and alcohol dependence is more prevalent among the unemployed, least educated, and lowest wage-earners. A study completed for the Substance Abuse and Mental Health Services Administration, in which 38,501 respondents over the years of 1994 through 1996 were surveyed, found that unemployed respondents were the most likely to report lifetime, past-year, and past-month illicit drug use. Unemployed respondents also consumed larger quantities of alcohol than those employed full-time. The same survey reported that the highest rate of substance dependence (39.5%) as defined by DSM-IV criteria was found in the unemployed group of respondents who had not graduated high school. The lowest wage earners, defined by the study as less than 10,000 dollars per year, also suffered higher rates of substance dependence than any other wage group (Townsend, Lane, Dewa, Brittingham, & Pergamit, 1999). Monitoring the Future findings from the same time period (1994-1996) indicated that among 8th, 10th, and 12th graders surveyed, between three and four times as many students who said that they had no plans to graduate from college had tried crack cocaine and heroin as had those students who planned to graduate from college (Johnston, O'Malley & Bachman, 1996). Of special interest to the current

study because of its community-level focus, Lo (2003) found in an epidemiological study of Drug Use Forecasting/Arrestee Drug Abuse Monitoring (DUF/ADAM) data from 1991 and 1992 across 24 metropolitan sites throughout the US that structural disadvantage (defined through an index measuring community-level socioeconomic statistics) explained 20% of the variance in testing positive for opiates at arrest, and that overall, arrestees residing in structurally disadvantaged areas were most likely to use cocaine and heroin.

Substance Abuse Treatment and Socioeconomic Characteristics

Treatment and clinical population research findings. Research reports much lower rates of employment among the addicted clinical population than the general population's employment rate. An estimate from the 1990s indicated that the clinical population's employment rate across samples enrolled in different types of substance abuse treatment was approximately only 15-35% (Platt, 1995). Additionally, it would appear that unemployment rates among the substance-abusing population are increasing (Walker & Leukefeld, 2002). A study of 256 substance abuse treatment candidates assessed for program eligibility found that those respondents who reported the most severe, multisubstance abuse problems were of the lowest social class and had low social stability (Wilkinson, Leigh, Cordingley, Martin, & Lei, 1987).

Socioeconomic class has also been shown to affect treatment outcomes. Often measured by length of time in treatment, program completion, and post-program recidivism or relapse, the findings summarized below suggest that the lower socioeconomic status frequently observed in the population in need of substance abuse treatment continues to negatively impact recovery efforts.

Retention in treatment

Substance abuse researchers often have observed that the length of time an individual stays in a treatment program increases the likelihood of recovery (Zhang, Friedmann, and Gerstein, 2003; Simpson, Joe, Rowan-Szal, & Greener, 1997). However, findings in both the general substance abuse research literature and in drug court studies frequently report that low socioeconomic status and factors that comprise dimensions of socioeconomic status, such as low levels of employment and education, correlate with poor program retention. Miller and Shutt found that social stability factors were a consistent predictor of program retention in drug court (2001), and Peters, Haas and Hunt also found longer drug court retention rates among participants who were employed (2001). Truitt et al.'s study (2002) found the strongest predictors of drug court retention to be older age and higher levels of education and employment.

Program completion

Research in the substance abuse treatment field and in drug court literature indicates that program graduates perform significantly better on rearrest/recidivism outcome measures than those who do not finish a program (Wallace & Weeks, 2004; Belenko, 2001; Peters & Murrin, 2000). Again, though, socioeconomic class factors

appear to relate to program completion in the same way as they relate to program retention. Findings from a residential treatment study reported that program dropouts were significantly more likely to have worked fewer months over their lifetimes, to report lower weekly wages, and to have a greater need of employment counseling than program completers (Lang & Belenko, 2000). Peters, Haas and Murrin (1999) found that employment was a significant predictor of drug court completion in their study on two Florida drug courts, and in one of the two jurisdictions, graduates were also significantly more highly educated than nongraduates. Truitt et al.'s 2002 study which reported that education and employment were among the strongest predictors of retention also found the same relationship to hold in predicting drug court graduation. In their 2002 study, Butzin, Saum, and Scarpitti reported that "social stakeholder values," which included an employment measure, and higher levels of education were among the factors most predictive of program completion.

Post-program outcomes

Though arguably the most important measure of treatment effectiveness, reports on how post-program outcomes differ by participant background characteristics are not frequently provided in the treatment literature; particularly within the drug court literature these findings are noticeably absent. This is possibly indicative of a "file drawer" problem, a known tendency for studies that report insignificant effects or focus upon when treatment does not work to remain unpublished (Rosenthal, 1995). However, studies that have examined this relationship report socioeconomic factors to impact post-program outcomes. McLellan et al. (1994) found that baseline measures of employment, including amount of income from work and estimates of days worked within the prior month were among the strongest predictors of post-program social adjustment in a study of 22 treatment programs that included methadone maintenance clinics, inpatient and outpatient substance abuse programs. In Peters, Haas and Murrin's 1998 evaluation of the Escambia County (Florida) drug court program, the researchers reported that participants who were rearrested were less likely to have completed high school (1999).

Theoretical Framework

The conceptual framework of the study referenced the theoretical perspectives of social conflict (Goode, 1997), social disorganization (Akers & Sellers, 2004), and social control (Bursik, Jr. & Grasmick, 1993) to explain the hypothesized relationships, including a proposed moderating effect of geographic isolation from metropolitan regions. The related criminological perspectives of social disorganization, social control and social conflict inform the framework of this study by providing a macro-oriented view to a problem often dealt with at the individual level. Theories about the impact of societal level influences upon substance abuse indicate that communities struggling with concentrations of low employment and high rates of poverty without an ameliorating balance of protective social bonds will contain more residents with a low stake in society. This leads to social disorganization and weaker social control functions that were traditionally performed by non-economic institutions of family, neighborhood, religion, local government, culture and education. Once a community's population is substantially

affected by these socioeconomic disruptions, it appears that residents who belong to the lowest socioeconomic class are least likely to overcome these obstacles (Turner & Kluegel, 1981).Residents of these disintegrating communities are characterized by alienation, anomie, and in some cases, powerlessness from this daily experience of societal conflict. One result of disorganization and conflict is that individuals may be more likely to engage in drug use and criminal activity. By creating a desire for the kind of respite and escape available through substance misuse, these conditions form a demand, and eventually, an ongoing supply of drugs. As drug selling increases, and drug problems become more severe, societal disintegration worsens, feeding a community-level downward spiral (Goode, 1999). Although the purpose of this study was not to specifically test the relationships between these concepts, the ideas presented above provided a useful conceptual framework for the study. These sociological perspectives helped formulate the research questions and laid the groundwork for the chosen analytic plan of the study (see Figure 1, Appendix p.1, for a diagram of the study's conceptual framework).

Hypotheses

As informed by the study's theoretical framework, hypotheses about during and post-treatment drug court outcomes included both individual level and community level socioeconomic and structural influences. Altogether, fifteen hypotheses were generated to investigate the influence of socioeconomic disadvantage upon during-program relapse, retention, completion, recidivism, and the length of time until participants recidivated. Instead of listing all of these in detailed form, the following research questions describe the content of these fifteen tested hypotheses: 1) Will individual participants' higher educational levels, higher levels of employment, and higher average income be positively related to drug court retention, during-program abstinence, drug court program completion, and lower levels of recidivism post-graduation?; 2) Can community-level poverty rates, employment rates, education level, crime rates and median income explain any independently meaningful amount of variance in during-program outcomes, program completion and post-program recidivism in addition to variation explained by the first hypothesis?; and 3) Will a moderating, positive effect be observed on the hypothesized relationship between socioeconomic disadvantage and participant outcomes among the counties that are the most geographically isolated from metropolitan regions?

Methodology

Retrospective, secondary data were collected from participants' files (N=655) who were admitted to drug court treatment between January 1, 2000 and February 2005 among all programs included in the study, representing thirty counties across the state. Of these, 467 were no longer enrolled in drug court because they had either completed the program or were terminated from treatment; these participants comprised the post-program outcomes study sample. All 655 participants' information was used to analyze during-treatment outcomes. Socioeconomic variables of interest (income, employment, and education level) as well as potential controls (race, disability, and mental illness

history1) and during-treatment outcomes (relapse incidents, retention length, and completion) were obtained from these files. Post-program recidivism data through 24 months after exiting the program were obtained from criminal abstracts.

This study investigated the relationships between the outcomes of during-treatment relapse, drug court program retention and completion, and post-drug court recidivism and predictors of community disorganization, social control and individual socioeconomic factors through the use of a multilevel analytic framework (Raudenbush & Bryk, 2002).In addition to conducting univariate and bivariate analyses, three types of generalized linear models (logistic regression, discrete-time event history analysis, and Poisson regression) were developed to explore these relationships. Specifically, the relationships between individual socioeconomic characteristics and the frequency of relapse while in drug court treatment, retention in treatment, successful completion of treatment, and post-program drug or alcohol-related recidivism were investigated through one-level regression models appropriate for the outcome variables. Next, the effect of community disorganization on these same drug court outcomes was accounted for by including a second level of analysis in a set of hierarchical generalized linear models, indexing county-level socioeconomic and crime statistics to estimate county-level disorganization (SOCIND). Last, the direct and interaction effects of metropolitan status on drug court outcomes were measured by also including at the second level of analysis a dichotomous indicator of metro/micropolitan status or non-metropolitan county status as classified by Census Bureau criteria (see Table 1, Appendix for all variables included in the study).

Results

Relapse

The primary finding that arose from the analysis of relapse data while participants were enrolled was that although an examination of individual level characteristics bore out some significant relationships with education, employment, ethnicity and income, once county-level variability was included in the analyses, these relationships disappeared. Relapsing was significantly associated only with the county in which one received drug court treatment, the second-level intercept in the multilevel model (= 1.785, $p < .001$; see Table 2, Appendix). However, the county characteristics specified as important to evaluate in this study, namely the social stability of these counties, were not related to how relapse frequency varies by region. Also, the individual-level characteristics chosen for testing were not related to relapse in the way expected. Though it was believed that this was due to the overrepresentation of some characteristics in the population, if this is true, it suggests that research conducted with convenience samples of clinical populations is highly vulnerable to sampling bias, even with large samples. The remaining question looming large from the analysis is why relapse rates vary so greatly by region, and how this can be ameliorated.

[1] Mental illness and disability status were considered as possible controls to be used in the study. However, bivariate analyses revealed no significant differences in relation to the outcomes of interest, so these were not included as controls so as to be able to utilize all case information in the multivariate analyses.

Retention

Retention in drug court was clearly related to the individual socioeconomic variables of interest, and apparently unrelated to context. Results of these analyses indicated that completing high school (OR = .575, $p < .001$) and higher income (OR = .983, $p = .002$) were both significant predictors of more time retained in treatment, and that these variables, along with the control variable of non-Caucasian race (OR = 1.942, $p < .001$) explained approximately 40% of the variance in program retention (Nagelkerke R2 = .396; see Table 3, Appendix). The contextual variables, however, provided nothing to assist in explaining the variability of retention rates. Perhaps the most surprising finding from this analysis is how much of the variability of staying in drug court treatment was related to socioeconomic factors, for almost 40% of the variance in retention rates was attributed to these factors in the analysis. This result is both interesting and troubling.

Graduation

Like retention in drug court, graduation was more closely related to individual characteristics of socioeconomic status than social control or disorganization as modeled by the level-two variables. Logistic regression analysis of program completion considering only level-one variables showed that higher incomes (OR = 1.014, $p = .04$) and completing high school (OR = 2.488, $p < .001$) were significant predictors of graduating from drug court. Though being employed was not significantly associated with graduation, it approached the .05 alpha level with a p value of .071 (OR = 1.482). Nagelkerke R2 provided a value of .105, indicating that these individual socioeconomic factors explained 10.5% of the variance in the likelihood of program completion.

Though the socioeconomic and stability measures at the county level hypothesized to further influence the likelihood of graduation were not associated with graduation, counties varied to the extent that the county intercept was one of the strongest effects in the multilevel model (= -1.255$p < .002$); also in the two-level model, income's relationship to completion fell slightly below the .05 threshold (OR = 1.012, $p = .064$). It is interesting that the relationship between employment and program completion did not surface as significant in the level-one contextual model, and then appear when county membership was included as a random intercept in the multilevel model (OR = 1.536, $p < .02$; see Table 4, Appendix). This difference may be due partly to the difference in estimation methods, but it may also be attributed to the better modeling option allowing random variance and error in the multilevel approach. It is not known at this point how important employment is, without further analysis beyond the scope of this initial study. Again, though only totaling 12% of the variance in the likelihood of graduation, to a participant in a program whose opportunities are limited to either finishing the drug court program or going to prison, the impact of these socioeconomic factors upon one's chances of graduating cannot be ignored.

Recidivism

Perhaps the most interesting findings emerged from the analysis of recidivism. Though studying both the likelihood and the hazard rate of recidivism was limited by the small number of individuals who did so during this time frame, much needs to be discussed and further evaluated about the factors which were significantly related to recidivism. As was posited in the conceptual framework of the study, a buffering effect was observed in the non-MSA counties. Community location, community stability, and level of urbanicity, while not associated with drug court retention or graduation, were the only variables found to directly influence the likelihood of and length of time until post-program recidivism. Though the direct effect of community instability as measured by the index score was associated with the likelihood of recidivism in the opposite direction than that specified by the hypothesis, the interaction between living in a non-metropolitan region and high community disorganization scores strongly reversed this relationship to recidivism. In non-MSA counties, the most rural of these regions, a one-unit increase in community stability as indicated by the SOCIND decreased the likelihood of recidivating 24 months after program completion by 100% (OR = .000, $p < .04$). County of residence as represented by the intercept remained significantly related to the likelihood of recidivating, and non-white race was also positively associated with an increased likelihood of recidivism (OR = 2.224, $p < .04$; see Table 5, Appendix). This finding supported the hypothesis that any effect of community instability on post-treatment recidivism may be buffered by isolation from urban influences. Similar findings emerged from analysis of recidivism hazard rates, except that non-Caucasian race did not significantly increase the hazard rate of recidivism (see Table 6, Appendix).

Utility for Social Work Practice

What these results suggest is that socioeconomic factors and community stability play an important role in drug court success. These findings indicate a need for increased research attention to the macro-level influences upon community-based substance abuse treatment. Results provided by this study also have the potential to impact both practice and policy. These findings suggest that individual and community socioeconomic frailties can directly and indirectly impede clients' treatment efforts. The practice implications of the findings indicate a need to acknowledge these critical factors in the direct work of drug courts, the clinical treatment community, and the criminal justice system. The observed relationships between employment, income, and education and program retention and graduation indicate that drug courts should be focusing more upon these program supports and services, and identifying these social and occupational functioning goals as equally important to clinical recovery objectives. In consideration of these influences, some policies which govern the administration of drug court treatment may require a shift in perspective. Social work is concerned with policies that affect community well-being, the well-being of vulnerable individuals and groups, and social justice. All of these areas are affected by the effectiveness of community-based intervention for substance abuse and substance-abuse related crime. The significant relationship observed between community factors and recidivism presents important information that must be taken into consideration. Drug court treatment that is

unsuccessful may result in the individual serving a prison sentence. If this is not solely the fault of the individual, but instead is related to both individual socioeconomic problems and contextual influences, this outcome is unjust. If community-level fragility creates resource-poor drug courts, individuals treated in these programs may not be receiving the same level of treatment as those in stronger communities. For empirically based practice to work and to apply what is gleaned from research, practitioners need tools to implement new strategies. This suggests that policymakers and stakeholders in communities must not only recognize these issues, but be willing to address them by policy. The study shows that communities need different things to make local programs function effectively and fairly for all of those impacted by them. A willingness to further examine the unique strengths and concerns of drug court programs and the communities in which they operate is a desirable and necessary step.

This outcome evaluation of multiple drug court sites in Kentucky produced interesting and useful findings for social work professionals invested in the development of effective substance abuse treatment options within their communities. Additionally, the methods used for this study shed light on the influence of social and community context that is likely not limited to only substance abuse treatment programs, and social work researchers and program evaluators may find this analytic framework helpful and appropriate for a wide range of social welfare program evaluations and client outcome studies.

References

Akers, R., & Sellers, C. (2004). Criminological theories: Introduction, evaluation, and application. (4th Ed.).Los Angeles: Roxbury Publishing Co., pp. 385-412.

American University. (2001). *Drug court activity update: Composite summary information,* May 2001. Washington, DC: Author.

American University. (2003). *Summary of drug court activity by state and county.* Washington, DC: OJP Drug Court Clearinghouse and Technical Assistance Project.

Banks, D. & Gottfredson, D.C. (2003). The effects of drug treatment and supervision on time to re-arrest among drug treatment court participants. Journal of Drug Issues, 3(2), pp. 385-412.

Belenko, S. (1999). Research on drug courts: A critical review 1999 update. *National Drug Court Institute Review, 2*(2), 1-58).

Belenko, S. (2001). Research on drug courts: A critical review 2001 update. New York: Center on Addiction and Substance Abuse, Columbia University.

Belenko, S. (2002). The challenges of conducting research in drug treatment court settings. *Substance Use and Misuse, 37*(12 & 13), pp. 1635-1664.

Belenko, S., Fagan, J.A., & Dumanovsky, T. (1994). The effects of legal sanctions on recidivism in special drug courts. *The Justice System Journal, 17*(1), pp. 52-81.

Bursik, Jr., R.J. & Grasmick, H.G. (1993). Neighborhoods and crime: The dimensions of effective community control. Lanham, MD: Lexington Books.

Butzin, C.A., Saum, C.A., & Scarpitti, F.R. (2002). Factors associated with completion of a drug treatment court diversion program. *Substance Use and Misuse, 37*(12&13), 1615-1633.

Deschenes, E.P. & Greenwood, P.W. (1994). Maricopa County's drug court: An innovative program for first-time drug offenders on probation. *The Justice System Journal, 17*(1), pp. 99-115.

Goode, E. (1997). Between politics and reason: The drug legalization debate. New York: St. Martin's Press.

Goode, E. (1999). *Drugs in American society.* (5th ed.). United States: McGraw-Hill College.

Gottfredson, D.C., Najaka, S.S., & Kearley, B. (2003). Effectiveness of drug treatment courts: Evidence from a randomized trial. *Criminology and Public Policy, 2* (2), pp. 171-196.

Harrell, A. (2003). Judging drug courts: Balancing the evidence. *Criminology and Public Policy, 2*(2), 207-213.

Harrell, A., Cavanagh, S., & Roman, J. (2000). Evaluation of the D.C. Superior drug court intervention programs. National Institute of Justice Research in Brief (NCJ 178941). Washington, D.C.: Office of Justice Programs.

Hiller, M., Knight, K., Leukefeld, C. & Simpson, D. (2002). Motivation as a predictor of therapeutic engagement in mandated residential substance abuse treatment. *Criminal Justice and Behavior, 29*(1), pp. 56-75.

Hora, P.F. (2002). A dozen years of drug treatment courts: Uncovering our theoretical foundation and construction of a mainstream paradigm. *Substance Use and Misuse,* 37(12&13), pp. 1469–1488.

Johnston, L.D., O'Malley, P.M., & Bachman, J.G. *National survey results from the Monitoring the Future Study, 1975-1995.* Vol 1, Secondary School Students. Rockville, MD: National Institute on Substance Abuse, 1996.

Lang, M.A. & Belenko, S. (2000). Predicting retention in a residential drug treatment alternative to prison program. *Journal of Substance Abuse Treatment, 19*, 145-160.

Leukefeld, C.G., Tims, F., & Farabee, D. (Eds.). (2002). *Treatment of drug offenders: Policies and issues.* New York: Springer Publications.

Lo, C. (2003). An application of social conflict theory to arrestees' use of cocaine and opiates. *Journal of Drug Issues, 3*(1), 237-266.

McLellan, A.T., Alterman, A.I., Metzger, D.S., Grissom, G.R., Woody, G.E., Luborsky, L., & O'Brien, C.P. (1994). Similarity of outcome predictors across opiate, cocaine, and alcohol treatment: Role of treatment services. *Journal of Counseling and Clinical Psychology, 62*, 1141-1158.

Miller, J.M & Shutt, J.E. (2001). Considering the need for empirically grounded drug court screening mechanisms. *Journal of Drug Issues, 31*(1), 91-106.

Nurco, D.N., Hanlon, T.E., Bateman, R.W., & Kinlock, R.W. (1995). Drug abuse treatment in the context of correctional surveillance. *Journal of Substance Abuse* Treatment, 12(1), 19-27.

Peters, R.H., Haas, A.L. & Hunt. (2001). Treatment dosage effects in drug court programs. In Hennessy, J.J. & Pallone, N.J. (eds.). *Drug courts in operation: Current research*, pp. 63-72. New York, NY: The Haworth Press.

Peters, R.H., Haas, A.L., & Murrin, M.R. (1999). Predictors of retention and arrest in drug courts. National Drug Court Institute Review, 2(1), 33-60.

Peters, R. H., & Murrin, M. R. (2000). Effectiveness of treatment-based drug courts in reducing criminal recidivism. *Criminal Justice and Behavior, 27*(1), 72-96.

Peyton, E. A., & Gossweiler, R. (2001). Treatment services in adult drug courts: Report on the 1999 National Drug Court Treatment Survey: Executive summary. Washington, DC: Drug Courts Program Office and Center for Substance Abuse Treatment.

Platt, J. (1995). Vocational rehabilitation of drug abusers. *Psychological Bulletin, 117*, 416-433.

Raudenbush, S.W. & Bryk, A.S. (2002). Hierarchical linear models: Applications and data analysis methods. (2nd ed.). Thousand Oaks, CA: Sage Publications.

Rosenthal, R. (1995). Writing meta-analytic reviews. *Psychological Bulletin, 118*, 183-192.

Simpson, D.D., Joe, G.W., Rowan-Szal, G.A., & Greener, J.M. (1997). Drug abuse treatment process components that improve retention. *Journal of Substance Abuse Treatment, 14*(6), 565-572.

Townsend, T.N., Lane, J.D., Dewa, C.S., Brittingham, A.M., & Pergamit, M. (1999).*Substance use and mental health characteristics by employment status.* Rockville, MD: National Opinion Research Center, Contract 283-95-0002, sponsored by the Substance Abuse and Mental Health Services Administration.

Turner, J. H. & Kluegel, J.R. (1981). Socioeconomic status. In M.E. Olsen & M. Micklin (Eds., pp.225-248), *Handbook of applied sociology: Frontiers of contemporary research.* New York: Praeger Publishers.

Truitt, L., Rhodes, W.M., Hoffmann, N.G., Seeherman, A.M., Jalbert, S.K., Kane, M., et al. (2002). *Evaluating treatment drug courts in Kansas City, Missouri and Pensacola, Florida executive summary.* Cambridge, MA: Abt Associates.

United States Department of Justice. (1997). *Defining drug courts: The key components.* Washington, DC: Department of Justice, Office of Justice Programs, Drug Courts Program Office.

Walker, R. & Leukefeld, C. (2002). Employment rehabilitation. In C.G. Leukefeld, F. Tims, & D. Farabee (Eds.), *Treatment of drug offenders: Policies and issues* (pp. 69-79). New York: Springer Publishing Company, Inc.

Wallace, A., & Weeks, W. (2004). Substance abuse intensive outpatient treatment: Does program graduation matter? *Journal of Substance Abuse Treatment, 27*(1), 27-31.

Wenzel, S.L., Turner, S.F., & Ridgely, M.S. (2004). Collaborations between drug courts and service providers: Characteristics and challenges. Journal of Criminal Justice, 32, 253-263.

Wilkinson, D.A., Leigh, G.M., Cordingley, J., Martin, G.W., & Lei, H. (1987). Dimensions of multiple drug use and a typology of drug users. *British Journal of Addiction, 82,* 259-273.

Zhang, Z., Friedmann, P.D., and Gerstein, D.R. (2003). Does retention matter? Treatment duration and improvement in drug use. *Addiction, 98*, 673-684.

Appendix

Figure 1. Conceptual framework of the study.

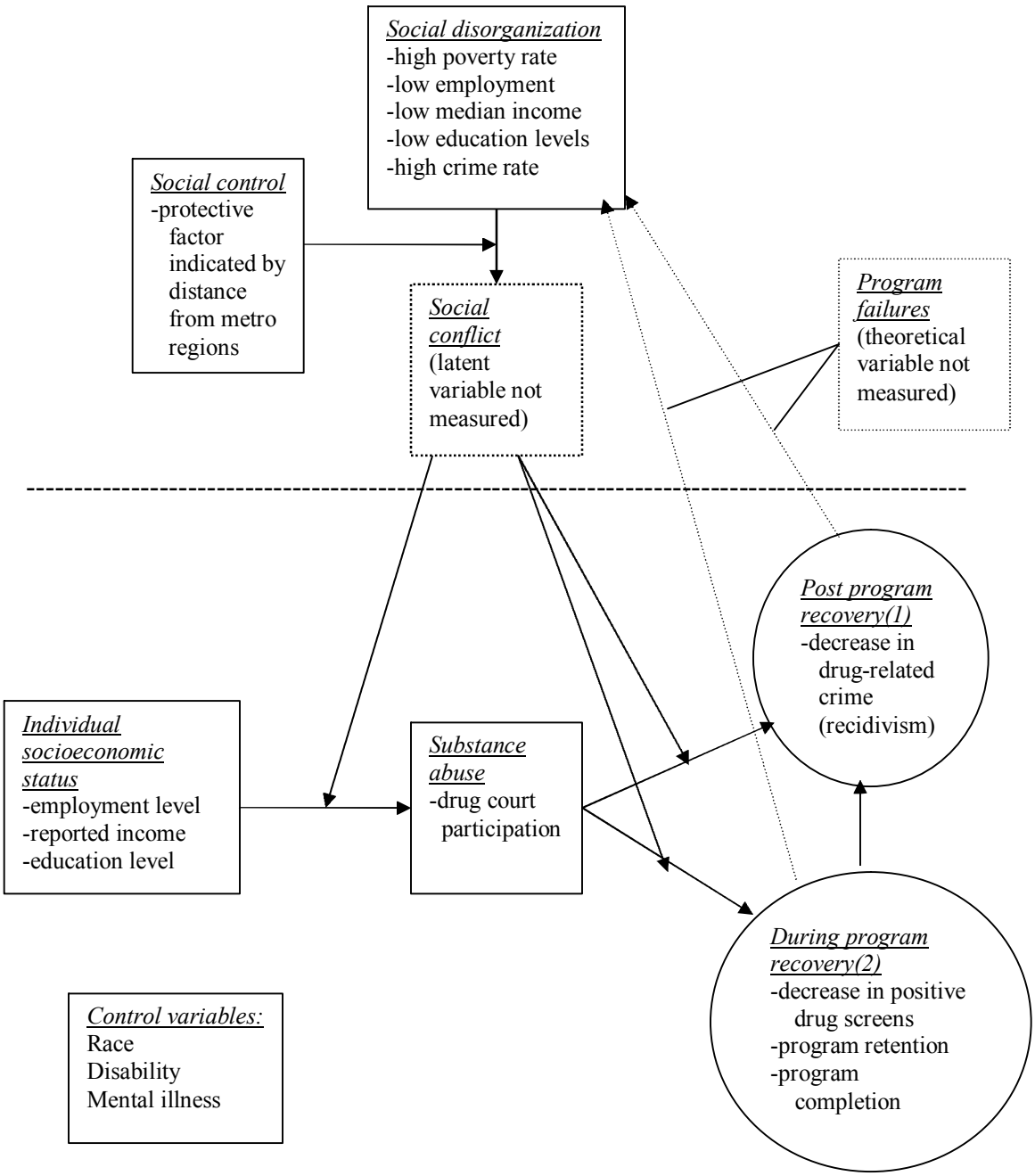

Table 1. Variables included in the study

Variable	Measurement	Analytic Method
Dependent Variables		
Drug court completion	Graduation	Logistic regression
Drug court retention	Months until termination	Discrete time event history analysis
Relapse during drug court	Number of positive screens while in the program	Loglinear analysis, Poisson regression
Post-program recidivism(1)	Any post-program drug or alcohol convictions	Logistic regression
Post-program recidivism (2)	Months until post-program arrest (conviction-within 24 months post-program)	Discrete time event history analysis
Independent Variables		
Income (square root transformed)	Income reported 30 days prior to enrollment	
Education	Completed high school or a GED (0 = no, 1 = yes)	
Employment	Employed at drug court entry (0 = no, 1 = yes)	
County disorganization	Index of % with high school education, % employed, median household income, % of residents in poverty, and county crime rate (log transformed SOCIND)	
Non-metropolitan status	County classification as a metropolitan/micropolitan statistical area (MSA = 0) or not (non-MSA = 1)	
Interaction of MSA status X SOCIND	Interaction effect between SOCIND and MSA status (log transformed SOCIND)	
Potential Control Variables		
Race	Non Caucasian race (1) or Caucasian (0)	
Disability	Receive disability pension (1) or not (0) (not used)	
Mental illness	In- or outpatient treatment history (1) or not (0) (not used)	

Table 2. Poisson regression of relapse frequency with L-2 variables.

Fixed Effect	Coefficient	Standard Error	T-ratio	d.f.	Approx. P-value	Event Rate Ratio	Confidence Interval
Intercept, B0 (G00)	-1.785	.203	-8.778	26	.000	.168	(.111, .255)
Ethnic, B1 (G10)	.277	.235	1.180	570	.239	1.319	(.833, 2.089)
Sqrtinc, B2 (G20)	-.006	.004	-1.447	570	.148	.994	(.986, 1.002)
Educ, B3 (G30)	.023	.162	.143	570	.887	1.023	(.745, 1.406)
Employ, B4 (G40)	-.084	.120	-.696	570	.486	.920	(.726, 1.164)
MSA (G01)	.397	.250	1.586	26	.124	1.488	(.890, 2.487)
SOCIND (G02)	-.096	2.325	-.041	26	.968	.909	(.008, 107.526)
MSAxSOCIND (G03)	-.833	3.494	-.238	26	.814	.435	(.000, 567.010)

Chi square value of the intercept = 77.051, p. < .000

Table 3. Discrete-time analysis of retention with L-1 variables only.

Variable	β	SE	Wald	Sig.	OR
Ethnic	.664	.190	12.257	.000	1.942
Sqrtinc	-.017	.005	9.907	.002	.983
Education	-.553	.156	12.607	.000	.575
Employ	-.251	.162	2.399	.121	.778
Ret8Mos	-.405	.166	5.933	.015	.667
Ret16Mos	-.704	.195	13.011	.000	.494
Ret24Mos	-.447	.296	2.280	.031	.640

Nagelkerke R^2 = .396

Table 4. HGLM logistic regression analysis of graduation, L-2 variables included.

Fixed Effect	Coefficient	Standard Error	T-ratio	d.f.	Approx. P-value	Odds Ratio	Confidence Interval
Intercept, B0 (G00)	-1.255	.308	-4.074	22	.001	.285	(.151, .540)
MSA (G01)	-.418	.477	-0.876	22	.391	.658	(.245, 1.769)
SOCIND (G02)	.033	2.686	0.012	22	.990	1.034	(.004, 269.584)
MSAxSOC (G03)	3.518	5.075	.693	22	.495	33.716	(.001, 1237427.255)
Ethnic, B1 (G10)	-.502	.283	-1.771	421	.077	.605	(.347, 1.056)
Sqrtinc, B2 (G20)	.012	.006	1.852	421	.064	1.012	(.999, 1.025)
Educ, B3 (G30)	1.015	.262	3.869	421	.000	2.760	(1.649, 4.620)
Employ, B4 (G40)	.429	.177	2.429	421	.016	1.536	(1.086, 2.173)

Table 5. HGLM logistic regression analysis of recidivism, L-2 variables included.

Fixed Effect	Coefficient	Standard Error	T-ratio	d.f.	Approx. P-value	Odds Ratio	Confidence Interval
Intercept	-2.663	.433	-6.151	18	.000	.070	(.028, .173)
MSA	-.317	.847	-.374	18	.712	.728	(.123, 4.310)
SOCIND	9.157	3.757	2.437	18	.026	9476.914	(3.564, 25196785.686)
MSAxSOC	-21.056	9.109	-2.312	18	.033	.000	(.000, .144)
Ethnic	.800	.374	2.135	415	.033	2.224	(1.067, 4.639)
Squrtinc	.004	.011	-.387	415	.698	.996	(.973,1.018)
Educ,	-.079	.337	-.235	415	.815	.924	(.477,1.790)
Employ,	-.017	.337	-.049	415	.961	.984	(.507,1.908)

Table 6. Discrete time analysis of recidivism, including L-2 variables.

Fixed Effect	Coefficient	Standard Error	T-ratio	d.f.	Approx. P-value	Odds Ratio	Confidence Interval
Intercept	-4.323	.609	-7.096	18	.000	.013	(.004, .048)
MSA	-.176	.841	-.210	18	.836	.838	(.144, 4.894)
SOCIND	7.764	3.597	2.159	18	.044	2353.872	(1.239, 4470169.318)
MSAxSOC	-19.093	8.949	-2.133	18	.047	.000	(.000, .734)
Post6Mos	1.016	.506	2.006	1214	.045	2.761	(1.023, 7.449)
Post12Mos	.637	.534	1.193	1214	.234	1.891	(.664, 5.386)
Post18Mos	-.422	.680	-.621	1214	.535	.656	(.173, 2.487)
Ethnic	.655	.351	1.863	1214	.062	1.925	(.966, 3.833)
Sqrtinc	-.003	.011	-.324	1214	.746	.997	(.976, 1.018)
Educ	-.078	.317	-.246	1214	.806	.925	(.496, 1.723)
Employ	-.031	.317	-.099	1214	.921	.969	(.520, 1.805)